Protection Against Pests — Controlling Flies

For a growing industry in a rapidly changing environment, the presence of pests is an ongoing concern that readily appears — numerous species of flies can breed in litter and manure, come to maturity (some in as few as seven days; most in two weeks), and disperse up to a mile or more from their breeding place. Manure handling systems must be carefully managed to prevent these annoying creatures from spreading disease (always a serious problem) or becoming a public nuisance and a focus for bad feelings.

Identifying the Enemy

Moist litter is not only a threat to surface and groundwater; it is also an ideal breeding ground for flies. Caged layer operations are the most susceptible to this problem, followed by breeder farms and, occasionally, broiler farms. Wherever poultry houses are susceptible to flooding, or litter is stored outdoors, the potential exists for fly-control problems.

Several species, including house flies (*Musca domestica*), blowflies, and *Fannia* spp., are bothersome, but it is the common house fly that creates the greatest outrage and danger. It crawls over filth and food products, breeds in all kinds of organic matter (plant material, spilled grains, and animal wastes), and reproduces by the thousands. A nuisance? Yes, but also a carrier of disease for animals and people.

Flies, which generally become active in the early spring (mid-March in many areas), have four stages of development: egg, larva, pupa, and adult. Most generations require about two weeks to develop. Females will produce 120 to 150 eggs in three or four days, and hatching occurs between eight and 24 hours later. House flies can complete their entire life cycle in as few as seven days; therefore, many of the newly hatched 150 flies will also breed within a few days. Twenty to 30 generations in a fly season is not unusual. As many as 1,000 flies can develop in a single pound of suitable breeding material. The actual rate of development depends, however, on the temperatures and moisture levels in the breeding area.

Management of manure so that it is not conducive to fly breeding is the most effective means of control. Fresh poultry manure generally contains 60 to 80 percent moisture. Fly breeding in this material can be minimized by reducing the moisture content to 30 percent or less. This reduction also encourages the development of beneficial insects which can displace developing houseflies or serve as predators of fly eggs and larvae, or both.

Dry manure management is practiced under two types of systems: (1) frequent manure removal (at least weekly), and (2) long-term, in-house storage of manure. Frequent manure removal systems to prevent fly breeding are based on weekly (or more often) removal, spreading, and drying of manure to break the fly breeding cycle. This system is effective if done regularly and thoroughly, but it requires adequate agricultural land where manure can be spread.

In-house storage of manure calls for drying the manure to about 30 percent or less moisture level and the capacity to maintain this level for up to a year. Where sufficient storage space is available, dry manure can be maintained for several years before being removed.

Once removed, land application is generally made. When poultry litter is applied, it should be spread thinly to promote drying. If fly larvae are in the litter, then incorporating it

into the soil as quickly as possible will help break the fly development cycle.

Good housekeeping and management practices that keep manure and litter dry are a first line of defense against flies. A partial list of such practices includes the following:

- Water troughs or cups should be free of leaks, drips, and condensation. The water pressure should be properly adjusted (to prevent dripping) and an on/off cycle should be used (to control condensation).
- Adjust the floor/grade relationship if the water table is high or if outside water can penetrate the house.
- Provide abundant cross-ventilation and avoid excessively high temperatures.
- Prevent dysentery with antibiotics, if necessary, and avoid foods that have a known laxative effect.
- Avoid excessively high house temperatures that encourage abnormal water intake.
- Use absorbent litter materials.
- Consider combining deep pit manure storage with composting for layer operations.

Chemical Controls

Under certain conditions, insecticides may be used to control adult flies in barns and poultry houses. But these products should be reserved for critical times when the management system breaks down, because flies quickly develop resistance. Insecticide applications may be regulated in some states and should be handled carefully to minimize any harmful effects associated with toxic ingredients.

By increasing their focus on outcomes, rather than inputs, growers will find that they have many more tools than insecticides to help them control flies. Consider composting, for example. Undisturbed litter that is free of moisture will slowly begin to compost naturally, and it will support a large number of predators and parasites that feed on fly larvae. These predators include beetles, mites, and parasitic wasps. Scavenger insects help aerate the litter and make it less suitable for fly development. Take care, however, to leave the litter undisturbed; time is needed to encourage the buildup of the beneficial insects. Schedule complete cleanouts, therefore, in the off-fly seasons, and make only spot applications of insecticides in the meantime to reduce the potential for resistance to insecticides.

Integrated Pest Management

Among many reasons to include new waste management practices and beneficial insects in the battle against flies is the dawning recognition that flies are not going to be eradicated. Instead, an integrated and routine program to *control* them must be implemented and practiced throughout each year. Other reasons to integrate pest management measures involve changes in our understanding of and attitudes toward pesticides:

- the choice of effective pesticides that can be safely applied is limited;
- flies develop resistance to even the most potent pesticides,
- avoiding insecticide residues in animal tissues and other products is essential, and
- pesticides are included in a general concern for the effects of agricultural chemicals on the environment.

Pesticides should be used, therefore, as part of an integrated system and with proper attention to practices that will minimize these concerns. Thus, consider insecticides as supplemental to good housekeeping and waste management, and use space spray with no residue to gain immediate control.

Use sprayers made especially to form aerosols that will remain in the air long enough to catch the adult fly and make the application early in the morning before the flies fly up to ceilings and support posts. Using portable equipment may help the applicator reach some difficult areas around the house.

Fly baits in wet or dry form can also be used as supplements to other methods. Liquid baits must be prepared by the applicator and brushed or sprayed on fly resting areas. Larvicides can be applied to manure below the cages and around waterers, but treating manure

regularly (and throughout the facility) is not recommended. Such a practice is costly, the flies quickly develop resistance, and the treatment will also kill the beneficial insects.

Some growers may want to investigate other practices, for example, feed-through larvicides or the commercially available parasitic wasps, or soldier flies, which reduce the volume of waste and crowd out houseflies.

Sticky fly papers and spot cards can be used to monitor the presence of flies. Spot cards are plain white cards stapled so that each side is available for the flies to rest on. The resting flies leave brown regurgitation and fecal spots on the cards, which are then retrieved and the spots counted. Chemical treatments are advised if the grower finds 50 spots per card per week. (The cards also provide a handy record of conditions — and indicate the grower's use of controls — should such a record be needed.

Some type of regular "scouting" or inspection schedule should be used throughout the year to determine where and when the fly population is developing, and therefore where and when to use cultural practices or pesticides. It can also help the grower determine the effectiveness of the control program overall.

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CONSTRUCTED WETLANDS

Agricultural runoff is one of the nonpoint sources of pollution that threatens the water quality in rivers and lakes of the United States. Water that flows off the land after precipitation events picks up fertilizers and animal wastes that have been applied to the soil and deposits them in lakes and rivers.

If the runoff is uncontrolled, it causes soil erosion and increases the presence of suspended solids, which can contain nutrients, pesticides, herbicides, and metals, in the water. Flooding and the degradation of rivers, streams, and lakes are possible consequences. Nonpoint source pollution can also threaten groundwater quality as the same pollutants leach through the soil.

Runoff can be controlled. Best Management Practices (BMPs) can be adopted as part of the poultry grower's operating procedure. For example, stormwater can be diverted from poultry houses and manure storage areas, and land applications can be made when no storms are predicted. In addition, the arsenal of BMPs now includes the use of constructed wetlands for treating runoff and wastewater.

Functions of Constructed Wetlands

Constructed wetlands are not considered to be waters of the United States; but components of a wastewater treatment system. Therefore, if there is a discharge from a constructed wetlands, a federal or state discharge permit may be required.

A constructed wetlands is a designed structure, or set of structures, that attempts to replicate the functions of a natural wetlands. As with natural wetlands, they support water tolerant or aquatic plants and their soils are saturated (waterlogged) or covered with shallow water for some part of the year. However, since constructed wetlands are designed to treat wastewater efficiently and effectively, they generally do not fulfill all the functions provided by a natural wetlands (e.g., they do not recharge groundwater or contribute to the creation of hydric soils).

The constructed wetland is the heart of the treatment system. It cleans wastewater by filtering and settling solids, decomposing organics, and adsorbing/absorbing other pollutants such as phosphorus and trace metals. The dissolved organic pollutants are removed by a complex group of microbes (bacteria, fungi, algae, and protozoa) that live in the wastewater and on plant and sediment surfaces. Since waste materials are food for most of these microbes, pollutants are gradually converted through complex food cycles into environmentally less damaging by-products (gases that escape to the air and inert solids that stay in the system).

The primary purpose of wetland plants is to provide a place for these microbes to attach and grow. Generally, treatment effectiveness increases with plant density, which allows a larger quantity of attached microbes to exist within the system. The density of plants also affects flow hydraulics. Uniform flow is enhanced by uniform plant densities, but variable densities create short-circuiting which reduces the retention time and treatment effectiveness of the wetland. In addition, plants make the system attractive and provide food and shelter for wildlife.

The system remains effective during winter because the microbes are still present on the dead stalks, stems, and roots of the vegetation. Because the biological processes slow down during winter, wetland systems are typically sized to meet treatment objectives during cold weather.

Designing Constructed Wetlands

Constructed wetlands can effectively treat poultry industry wastewaters, including stormwater runoff. These wetlands are designed by engineers and built to restore, enhance, or replace the physical, chemical, and biological processes in natural wetlands. They are typically used as polishing cells following conventional primary treatment facilities such as lagoons, settling basins, or septic tanks. The integrated treatment system provides a higher quality wastewater that may be recycled or discharged to a receiving stream if appropriate permits are obtained.

In addition, the volume of treatable wastewater may be substantially reduced during the growing season because of evapotranspiration by the plants. For example, a poultry producer currently having difficulty with overflowing lagoons during wet weather now has the option of adding constructed wetlands, which can be used to treat a portion of the lagoon wastewater during the growing season. Typically the wastewater in the wetlands will be evapotranspired, but any effluent can also be recycled as process waste or as irrigation water.

Constructed wetlands consist of one or more "cells" of wetland plants in series or parallel. Construction can be easily accomplished. Excavate the area to shape the bottom of the wetlands and build small dikes around it. Line the bottom and sides of the excavated areas with clay or a synthetic material. Use PVC pipe to distribute and collect wastewater and to control water levels in the wetland. Water levels are normally shallow — about 3 to 12 inches. Uncontaminated runoff can be diverted from the system by berms or other buffers or grading.

A lagoon, detention basin, or other type of solids trap is used in front of the constructed wetlands to remove heavy or coarse solids. Some contaminated runoff contains high sediment loads and decomposing organic matter that may settle in bottom deposits. Because these deposits can adversely affect the hydrology and life forms in the wetland, the solids trap is particularly important.

Most wetland systems for treating agricultural related wastewaters will not be larger than one or two acres. In general, they should not be located in areas with steep topography, shallow topsoil, or limited space. They must be properly constructed to ensure groundwater protection. Federal, state, or local cost-share funds may be available for constructed wetlands.

Management

Wetland plants include mixtures of cattails, reeds, bulrushes, sedges, and grasses that are normally native to the area. The plants provide the right conditions for the microorganisms that live in the wetlands and break down the pollutants.

Pond and wetland systems are particularly effective because ponds can be designed to catch the stormwater and slowly release it to the wetlands following the storm. This technique keeps the wetlands wet for longer time periods, which can be especially important during dry seasons.

The systems need little routine maintenance but should be inspected periodically to detect any loss of plants, leakage through the dikes, clogging of the pipes, mosquitoes, or short-circuiting of the flow. These problems and others are usually easily corrected.

Properly managed constructed wetlands are cost effective, energy efficient, and simple to operate. They accept varying pollutant loads, attract a variety of wildlife, and add diversity to the farm landscape. Above all, constructed wetlands can help achieve clean water.

Information on the design and construction of wetlands for managing wastewater is available from USDA Natural Resources Conservation Service local offices, and the U.S. Environmental Protection Agency.

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Using Litter to Generate Heat and Electricity

Incineration of on-farm poultry mortalities increases in popularity as new technologies add affordability to perceived environmental and health advantages that incineration can offer over other methods of dead bird disposal. Now, engineering and technological developments are occurring to determine if burning litter is a feasible alternative or complementary to other methods of poultry litter management.

Examples of two loosely related, developing alternatives are presented here: the first burns air-dried litter to produce energy for regional distribution; the second, collects litter in a fluidized-bed combustion system and uses it to heat the poultry house. Applying these methods to poultry litter management requires considerable research and development because they have so far been too expensive to use in small systems.

Using Air-dried Litter as an Alternative Fuel

The first in a new breed of commercial electricity generating stations fueled by poultry litter was introduced in the United Kingdom in 1992. Today, the plant, which cost $30 million has a gross output of 14.2 megawatts.

The plant is fired on about 143,300 tons of litter per year (roughly the same energy as would be derived from 66,139 tons of coal). Special road vehicles deliver the material to the plant's storage bunker. The area of production is within a 31-mile radius of the plant.

Environmentally, this technology has a lot to offer:

- it creates demand for the product that effectively prevents the excessive application of litter on agricultural fields, thereby protecting water resources and restoring nutrient balance;
- gases produced in the process are low in major pollutants and after treatment in a three-stage electrostatic precipitator are suitable for discharge to the atmosphere;
- it is low in cost and continuously available; and
- the ash by-product is high in potash and can be removed from the plant in bulk and used as a component of manufactured agricultural fertilizers.

Fluidized-bed Combustion

Fluidized, or bubbling, bed combustion has been used, worldwide, in industry, for more than 20 years. Now some agricultural and government researchers and others in the poultry and waste management industries are probing the usefulness of burning poultry litter in a fluidized bed combustion system.

The objectives of modifying or otherwise developing this technology are twofold: first, to determine whether this method can dispose of litter efficiently and cleanly; and second, whether this biomass is a suitable raw material for energy production.

Recent claims suggest that the technology has many applications:

- the generation of hot gases for heating and drying;
- the generation of electrical power;
- the generation of steam and pressurized systems to suit process inlet requirements.

If so adapted, it would have several advantages:

- modular designs that are inexpensive and easy to install;
- reduced power consumption to save operating costs;
- adaptable to a variety of waste streams should conditions change; and — of most importance to some poultry growers —
- ability to burn waste materials having an extremely high moisture content.

If these and other technologies for converting litter to energy are successful, they will help expand potential uses for litter, increase environmental well-being, and contribute to economic sustainability.

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Alternative Bedding — Select Materials May Have Hidden Values

In the Near East (Morocco), straw is the conventional poultry litter. Recent drought conditions, however, have depleted supplies, forcing growers to pay more and settle for less — or find alternatives. This story is repeated in many regions: the conventional bedding materials and the cause of the shortage may vary, but the race is on for finding suitable alternatives.

A further impetus to trials involving litter materials is the challenge growers face each day: the perception, whether imagined or real, that they must do more to help meet state and regionally mandated reductions in the total volume of wastes stemming from human activities (rural and urban). These "goals" are generally 25 to 40 percent of the total volume produced at the time the goal was set. Particular goals depend on the overall status of resources in the watershed.

The search for alternative litter supplies has environmental consequences on both counts. First, used litter constitutes a large part of the material that each grower must land apply, compost, convert to energy, or otherwise dispose of or recycle. Second, the choice of litter materials may have unexpected benefits: some producers have found that using shredded paper as a litter material reduces odor and provides a nearby market for the town's newspaper recycling program.

Straw

The Moroccan study tested alternative litter materials on cockerel performance and litter quality. The materials investigated included soft wheat straw (whole or ground), rice straw (ground) wood shavings and rice hulls, alone and in combination. The birds' performance, water consumption, and leg injuries or defects were measured; and the various litters were compared for moisture content, pH, temperature, overall cleanliness scores, and buildups of dust and ammonia.

Differences were noted in the litters, but they were inconclusive. However, straw-based litters had the highest moisture content, pH values, and temperatures, and they received the lowest scores when subjectively rated. Notwithstanding this finding, all materials tested, including straw, were deemed suitable bedding materials, singly or in combination with other materials.

Evaluating Alternative Materials

Fine-textured particleboard residue, a by-product of the wood manufacturing industry that usually ends up in landfills, has been proposed as a way for poultry growers to compensate for the increasing scarcity of hardwood or pine shavings in Indiana. In this case, the shortfall in conventional bedding materials may be driving the search for alternatives but the alternatives themselves — for example, sand, particleboard, newspaper, rice and peanut hulls, ground corn cobs, cereals, and grasses — are turning up some surprising trade-offs.

Previous investigations of litter sources correlated the type of bedding with significant differences in bird performance and carcass and litter quality. Thus, the quantitative and qualitative properties in each kind of litter should be taken into consideration before litter is purchased and placed in chicken houses.

Evaluating the performance of the litter generally involves a comparison of two or

more types of litter and a litter prepared from the same ingredients but combined to study the effects of using both at one time. Other management and environmental practices, for example, dietary arrangements, types of feeders and waterers, and litter removal or replacement must be handled the same way throughout the trial in all pens included in the experiment.

Parameters chosen to measure the effects, if any, of the litter on the birds' condition and on the quality of the bedding include the birds' weight gain, feed conversion, mortality, and water consumption; and the degree of caking, pH, ammonia nitrogen, temperature, dust, and moisture conditions in the litter. In the Moroccan trials, for example, each of the materials included in the experiment tested as "suitable" for litter, though straw got lower index values for cleanliness. No statistical differences could be found in the way these materials acted, and no correlation was observed between increased litter moisture levels and leg abnormalities.

Investigators concluded therefore, that even litter materials that may warrant minor complaints, for example, straw, can be used as needed. They could be used as a base, for example, and top-dressed with less available but more preferred materials, such as sawdust or wood shavings. Future studies may profitably assess the litter microbiological parameters and carcass side-effects.

Litter Alternatives Tested in Indiana

Fine and coarsely textured particleboard litter trials carried out on male turkey farms in Indiana yielded good results; the particleboard, containing less moisture to begin with produced a cleaner, drier product initially. It was drier and had less bacteria and mold on day zero.

The birds raised on fine particleboard had several advantages over the pine shavings and coarse particleboard, including fewer breast buttons and leg abnormalities and a 0.22 kg gain in muscle deposition, which off-set a 0.16 kg reduction in market body weight (as compared to birds grown on the traditional litter).

Coarse particleboard, on the other hand, has jagged edges. The birds suffered some foot-pad dermatitis, but not to a level to cause concern. Therefore, coarse particleboard is also an acceptable litter material for use on male turkeys.

Sand

Sand is another material that shows continuing potential as an alternative bedding material. In recent trials, chicks were randomly assigned to litter treatments of either sand or pine shavings. The birds' health and performance were compared at 50 days of age; carcass grade and yield and foot pad lesions were examined by processing 10 male and 10 female birds per pen; and bacterial counts were determined at the end of the trial by analyzing pooled litter samples taken from each pen.

No differences were found in body weights, mortality, or feed conversion in the birds; and no significant differences were found in their carcass grade or yield or foot pad lesions. Likewise, no differences were found for litter moisture or litter temperatures. Abdominal fat yields, however, were significantly lower for the birds grown on sand litter, and the sand pens also had significantly lower E. coli and aerobic plate counts than the pine shavings pens (6.09 and 7.25 CFUs/g, respectively). The trials continue; however, sand is already an acceptable alternative.

New or Recycled Paper

Broiler growers in the Northwest tested virgin and recycled paper-mill waste as an alternative to fir shavings and rye grass. The results showed no difference in the birds' four- or seven-week body weights, feed conversion rates, or mortality. However, the houses containing the short fiber pulp and paper waste litter produced less caking.

In northern Georgia, the Chestatee-Chattahoochie Resource Conservation and Development Council, in cooperation with the North Georgia Waste Management Authority and local poultry integrators, evaluated various recycled paper products as poultry bedding. The recycled paper proved to be equal to or better than the traditional wood shavings, sawdust or rice hulls.

Coffee Bean Hulls, Straw, Wood, and Paper

Kentucky tested coffee bean hulls, wheat straw, wood shavings and two kinds of paper ("mixed paper and recycled hardback books" and "mostly hardbacks") The birds showed no

significant differences in body weight, feed consumption and efficiency, breast blisters, or leg abnormalities. However, the caking effect and temperature were highest in wood shavings. The litter temperature in all cases was higher than the ambient temperature.

An Interesting Corollary

Pending additional study, growers can use a variety of materials to substitute for or to replace conventional bedding materials, and therefore some measure of control over failing supplies or rising prices, and other factors than supply and demand can influence this choice.

So what about the use of products (e.g., recycled paper, plant residues, or sawdust and chips generated in wood product manufacturing) that nobody else wants? Can we really use paper diverted from landfills, such as newspaper and old phone books?

Those who have tried it think we can. In their view, bedding made from recycled paper is cleaner than some other bedding materials. It is higher in density and absorbency, provides additional pest control, and helps control odor. In the house, its proponents suggest, it lets chicks grow in less stress; and in the field, it decomposes quickly.

At the present time, paper makes up about 38 percent of the waste stream. Using it as a bedding material presents an interesting possibility.

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Phytase Supplements — A Feed Additive that is Good for the Environment

Recent studies of nutrient enriched waters suggest that land applications of poultry litter and manure and mortality compost based on nutrient management planning are helping to protect the environment. But nutrient management plans also have an anomaly: namely, they are too often based on nitrogen alone. The practice has inadvertently contributed to a build up of phosphorus in soils that far exceeds plant needs and is easily released to the environment. The problem is compounded because phosphorus is an important dietary nutrient for poultry, and high levels of phosphorus are found in poultry waste.

The solution, it now appears, must be twofold: we must stop applying so much phosphorus to the land — in some regions, no phosphorus at all — and, if possible, we must find ways to limit the available phosphorus in poultry waste. Phytase, an enzyme that increases the availability of naturally occurring phosphorus in poultry diets while decreasing the level of phosphorus found in poultry waste, may be part of the solution.

Adequate dietary phosphorus is a requirement for healthy birds, and inorganic supplements of calcium and phosphorus are normally included in their diet — sometimes at extremely high levels — to guard against leg weakness, improve bone density and egg quality, and enhance weight gains. However, when phytase is used as a dietary supplement, both calcium and phosphorus supplements can be greatly reduced.

Phytase has a positive effect on bird growth: according to trials performed at the University of Minnesota, which linked the use of phytase supplements to profitability (i.e., to the bird's market value). Tests described by BASF Animal Nutrition, the U.S. marketer of phytase under the brand name Natuphos, indicate that turkeys fed 73 percent of recommended inorganic phosphorus supplements, 100 percent of the recommended calcium, and 500 units of phytase per kilogram of feed resulted in 20 percent higher net returns than for turkeys fed the conventional way. A positive net return was also noted for birds fed 52 percent of the recommended phosphorus supplements and 200 units of phytase per kilogram of feed. Birds fed inadequate levels of phosphorus without phytase performed poorly and resulted in negative net returns.

Other Studies

Other projects to evaluate phytase have demonstrated similar results.

- Research funded by the Georgia-based U.S. Poultry and Egg Association in 1996 showed that feeding phytase and a vitamin D3 derivative to broilers reduced the birds' need for dietary phosphorus.
- Phytase supplements have also been shown to improve calcium and phosphorus use in commercial layers as determined by egg shell quality, feed consumption, egg production, and egg weight.
- Other benefits of phytase supplements that have been demonstrated indicate that they can correct the adverse effects of egg production associated with low dietary phosphorus and significantly reduce the impact of low dietary calcium on bird health.

▼ Broilers and hens on corn-soybean diets supplemented with phytase also showed significant linear responses to increasing levels of phytase. The study concluded that phytase increased the use of dietary phosphorus.

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RESOURCE INFORMATION 1

POULTRY WATER QUALITY CONSORTIUM

The poultry industry and three government agencies have joined together to form the Poultry Water Quality Consortium to promote better environmental management by the rapidly growing poultry industry.

The Consortium encourages the use of poultry by-products as a resource rather than letting them become a pollution source. As the industry grows, protecting natural resources is becoming a major priority, demanding new technologies in poultry by-product development, storage, utilization, and land application.

The Consortium is responding to this environmental challenge by promoting cooperation and the exchange of information between the poultry industry and government agencies on water quality and by-product utilization issues. Focusing on pollution prevention, the Consortium will facilitate the development and transfer of new technologies designed to protect water quality and promote a clean environment.

Members of the Consortium

- U.S. Poultry & Egg Association
- Tennessee Valley Authority
- U.S. Environmental Protection Agency
- U.S. Department of Agriculture – Natural Resources Conservation Service

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POULTRY WATER QUALITY CONSORTIUM
6100 Building, Suite 4300 • 5720 Uptain Road • Chattanooga, TN 37411
Tel: 423 855-6470 • Fax: 423 855-6607

PIGEON.0744

Banner000428

U.S. Poultry and Egg Association

Founded in 1947, the U.S. Poultry & Egg Association is the largest and most active poultry organization of its kind. Known as the "All-Feather Organization," the association addresses the changing needs of those involved in producing and processing poultry and eggs.

The U.S. Poultry & Egg Association is dedicated to the growth and development of the poultry industry and represents the entire industry — from the producers of eggs, broilers, and turkeys to the processors of poultry and egg products and the many allied companies serving the industry.

U.S. Poultry & Egg has a long-standing commitment to promoting continuous improvement in environmental management by the poultry industry.

Services Available to Poultry Growers

U.S. Poultry is best known for its annual International Poultry Exposition, held in January in Atlanta, Georgia. The Expo features the world's largest display of technology, equipment, and supplies used to produce and process poultry and egg products.

Continuing education is a high priority. The association's seminar program has expanded into a comprehensive schedule of workshops and clinics to keep the poultry industry informed. Twelve seminars are held each year.

Through its government relations program, U.S. Poultry and Egg keeps Congress and federal agencies aware of industry needs, and informs members of government actions.

The association's research program returns millions of dollars to the industry. Research grants are used to find better ways of producing poultry and egg products. Members are kept aware of industry developments through the distribution of newsletters, reports, and memos.

Contact

Don Dalton, President
U.S. Poultry & Egg Association
1530 Cooledge Road
Tucker, GA 30084
TEL: (770) 493-9401
FAX: (770) 493-9257

USDA Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS), an agency within the U.S. Department of Agriculture (USDA), administers national soil and water conservation programs with the cooperation of landowners and operators in local soil conservation districts and other government agencies. It has traditionally provided technical and financial assistance to the U.S. agricultural community to help individuals plan, design, and implement waste management systems and other conservation projects. In addition, NRCS offers education, research, and database development.

The NRCS focuses on nonpoint source pollution and its effects on soil, water, air, plants, animals, and people. Potential agricultural contaminants include pesticide residues, nutrients, salts, trace minerals, and sediment. To help the agricultural community treat or prevent water quality problems, NRCS promotes economically feasible and practical measures, such as the environmentally safe management of dead birds, litter, and manure; the development of nutrient management plans; and the construction of litter storage facilities.

NRCS also encourages voluntary approaches to solving resource problems as it works to insure a continuing exchange of information.

Services Available to Poultry Growers

Through its conservation practices, the NRCS provides planning, design, and construction assistance on waste treatment lagoons, manure and litter dry-stacking facilities, poultry mortality facilities, management, and nutrient management plans based on soils, crops, and equipment availability. It also serves as technical representative for USDA cost-share programs to implement nutrient and poultry mortality management systems and, in some cases, provides financial as well as technical assistance in special project areas. The NRCS works closely with state regulatory agencies in waste management.

Contact

For more information about NRCS programs and assistance, call or visit the NRCS office listed in your local telephone directory under U.S. Department of Agriculture.

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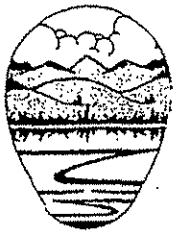
Tel: 423-855-6470 • Fax: 423 855-6607



TENNESSEE VALLEY AUTHORITY

The Tennessee Valley Authority (TVA) is committed to develop and implement programs and activities that will assist agriculture and agribusiness to protect the environment. Protecting water quality is a major concern of TVA, as illustrated by its ongoing projects related to nonpoint source protection.

TVA has established close ties with federal and state agencies, universities, and private organizations concerned with water resources management and nonpoint source control and, therefore, is in an excellent position to identify, demonstrate, and transfer poultry by-product resources technology to potential users.

Services Available to Poultry Growers

TVA's programs and projects primarily deal with helping prevent or reduce impacts of the poultry industry on the environment. This service is accomplished through educational workshops and demonstrations in cooperation with other federal and state agencies.

Contact

Richard Strickland
Tennessee Valley Authority
P.O. Box 1010
Muscle Shoals, AL 35662-1010
Tel: (205) 386-2542
Fax: (205) 386-2542

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U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) is dedicated to improving and preserving the quality of the environment and reducing risks to human health and the environment. Point and nonpoint sources of pollution are addressed under the Clean Water Act.

Certain poultry production, processing and rendering plants are regulated as point sources and may be required to obtain a permit. However, many of EPA's efforts to prevent or reduce water pollution associated with poultry by-products involve nonpoint source pollution. EPA helps states develop their nonpoint source assessments and management programs and provides assistance to implement nonpoint source control practices.

EPA believes the Poultry Water Quality Consortium will lead to greater cooperation between the poultry industry and government agencies on water quality and by-product utilization, thus reducing environmental and health risks and benefiting agriculture and the larger community.

Services Available to Poultry Growers

EPA administers a variety of nonpoint source control programs to address animal waste problems associated with smaller operations.

Currently, funds are provided to states under section 319(h) of the Clean Water Act to help them implement nonpoint source management programs including, for example, demonstrations of poultry composting facilities or development of educational manuals or regulations to address poultry by-products. EPA provides assistance to states to implement nonpoint source controls under other programs such as the Chesapeake Bay Program, the Gulf of Mexico Program, and the Clean Lakes Program.

Contacts

The U.S. Environmental Protection Agency, headquartered in Washington, DC, operates 10 regional offices.

U.S. EPA, Region 1
(CT, MA, ME, NH, RI, VT)
John F. Kennedy Federal Building
One Congress Street
Boston, MA 02203
TEL: (617) 565-3420
FAX: (617) 565-3660

U.S. EPA, Region 2
(NJ, NY, PR, VI)
290 Broadway
New York, NY 10007
TEL: (212) 637-3000
FAX: (212) 637-3526

U.S. EPA, Region 3
(DC, DE, MD, PA, VA, WV)
841 Chestnut Building
Philadelphia, PA 19107
TEL: (215) 566-5000
FAX: (215) 566-5103

U.S. EPA, Region 4
(AL, FL, GA, KY, MS, NC, SC, TN)
61 Forsyth Street, SW
Atlanta, GA 30303
TEL: (404) 562-9900
FAX: (404) 562-8174

U.S. EPA, Region 5
(IL, IN, MI, MN, OH, WI)
77 W. Jackson Boulevard
Chicago, IL 60604
TEL: (312) 353-2000
FAX: (312) 353-4135

RESOURCE INFORMATION

U.S. EPA, Region 6
(AR, LA, NM, OK, TX)
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733
TEL: (214) 665-6444
FAX: (214) 665-2146

U.S. EPA, Region 7
(IA, KS, MO, NE)
726 Minnesota Avenue
Kansas City, KS 66101
TEL: (913) 551-7000
FAX: (913) 551-7467

U.S. EPA, Region 8
(CO, MT, ND, SD, UT, WY)
999 18th Street, Suite 500
Denver, CO 80202-2466
TEL: (303) 312-6312
FAX: (303) 312-6339

U.S. EPA, Region 9
(AS, AZ, CA, GU, HI, MP, NV, TT)
75 Hawthorne Street
San Francisco, CA 94105
TEL: (415) 744-1305
FAX: (415) 744-1514

U.S. EPA, Region 10
(AK, ID, OR, WA)
1200 Sixth Avenue
Seattle, WA 98101-9797
TEL: (206) 553-1200
FAX: (206) 553-0149

U.S. EPA, Headquarters
Office of Water
401 M Street, SW
Washington, DC 20460
TEL: (202) 260-5700
FAX: (202) 260-5711

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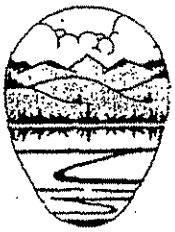

DIRECTORY OF POULTRY ASSOCIATIONS STATE, REGIONAL, AND NATIONAL

The following state, regional, and national organizations are listed in alphabetical order. The organizations in most states are therefore listed together; however, if you are looking for a particular association, please consult the entire list. The Wilkes Area Poultry Association, for example, is listed under W, not under North Carolina. We hope that we have not inadvertently omitted or incorrectly identified any organization or its address. This material will be updated from time to time.

ALABAMA POULTRY & EGG ASSOCIATION
P.O. Box 240
Montgomery, AL 36104-0240
TEL: (334) 265-2732
FAX: (334) 265-0008
John Q. Adams, Executive Director
www.johnnyadams@apend_link.net

ALASKA DIVISION OF AGRICULTURE
P.O. Box 949
Palmer, AK 99645
TEL: (907) 745-7200
FAX: (907) 745-7112
Doug Warner, Development Specialist
Douglasw@dnr.state.ak.us

AMERICAN EGG BOARD
1460 Renaissance Drive
Park Ridge, IL 60068
TEL: (847) 296-7043
FAX: (847) 296-7007
Louis Raffel, President
www.aeb.org

AMERICAN POULTRY ASSOCIATION
26363 South Tucker Road
Estacada, OR 97023
TEL: (508) 473-8769
Karen Poor

ARIZONA POULTRY IMPROVEMENT BOARD
37860 West Smith
Enke Road
Maricopa, AZ 85239
TEL: (520) 568-2273
FAX: (520) 568-2556
Dr. Ed Bicknell

ARIZONA POULTRY FEDERATION
c/o Hickman's Egg Ranch
7403 North 91st Avenue
Glendale, AZ 85305
TEL: (602) 872-1120
FAX: (602) 872-9220
Glenn Hickman, Director

ARKANSAS POULTRY FEDERATION
P.O. Box 1446
Little Rock, AR 72203-1446
TEL: (501) 375-8131
FAX: (501) 375-5519
Don Allen, Senior Vice President

CALIFORNIA EGG COMMISSION
1150 North Mountain Avenue
Suite 114
Upland, CA 91786
TEL: (909) 981-4923
FAX: (909) 946-5563
Robert D. Pierre, President
www.eggcom.com

CALIFORNIA POULTRY INDUSTRY FEDERATION
3117 A McHenry Avenue
Modesto, CA 95350
TEL: (209) 576-6355
FAX: (209) 576-6119
Bill Mattos, President
http://www.cpif.org

COLORADO POULTRY IMPROVEMENT BOARD
4816 E County Road, #30
Ft Collins, CO 80525
TEL: (970) 226-3680
William C. Lower, Secretary/Treasurer

RESOURCE INFORMATION

CONNECTICUT POULTRY ASSOCIATION
Department of Agriculture
165 South Capitol Avenue
Hartford, CT 06106
TEL: (203) 566-5268
FAX: (203) 566-8791
Director, Bruce Sherman

DELAWARE POULTRY IMPROVEMENT ASSOCIATION
RD 6, Box 48
Georgetown, DE 19947
TEL: (302) 856-7303
FAX: (302) 856-1845
Daniel Palmer, Poultry Specialist
39976@udel.edu

DELMARVA POULTRY INDUSTRY, INC.
RD 6, Box 47
Germantown, DE 19947-9575
TEL: (302) 856-9037
FAX: (302) 856-1845
Bill Satterfield, Executive Director

FLORIDA POULTRY FEDERATION
4508 Oak Fair Boulevard, Suite 290
Tampa, FL 33610
TEL: (813) 628-4551
FAX: (813) 620-4008
Charles R.Smith, Executive Director

GEORGIA EGG ASSOCIATION & COMMISSION
16 Forest Parkway
Forest Park, GA 30297
TEL: (404) 363-7661
FAX: (404) 363-7664
Robert Howell, Executive Director

GEORGIA POULTRY FEDERATION
P.O. Box 763
Gainesville, GA 30503-0763
TEL: (770) 532-0473
FAX: (770) 532-7543
Abit Massey, Executive Director

GEORGIA POULTRY IMPROVEMENT ASSOCIATION
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Oakwood, GA 30566
TEL: (770) 535-5996
FAX: (770) 539-1948
James Scroggs, Director

HAWAII FRYER COUNCIL
1818 Kanakanui Street
Honolulu, HI 96819
TEL: (808) 841-2828
E.F. Morado, President

HAWAII EGG PRODUCERS ASSOCIATION
841 Bishop Street, Suite 850
Honolulu, HI 96813
TEL: (808) 522-5133
FAX: (808) 522-5144
Vernon Char, Attorney

IDAHO POULTRY INDUSTRY
c/o Merrill Poultry Farms, Inc.
Rt. 2, Box 2184
Paul, ID 83347
TEL: (208) 438-4605
FAX: (208) 438-8694
Lloyd Merrill, President

ILLINOIS POULTRY INDUSTRY COUNCIL
282 Animal Science Lab
1207 West Gregory
Urbana, IL 61801
TEL: (217) 244-0195
FAX: (217) 333-7861
Kenneth W. Koelkebeck, Executive Secretary

ILLINOIS STATE TURKEY GROWERS ASSOCIATION
9193 Tampico Road
Rock Falls, IL 61071
TEL: (815) 438-2580
Merle Gaulrapp, Director

IOWA POULTRY ASSOCIATION
535 East Lincoln Way
P.O. Box 704
Ames, Ia 50010-0704
TEL: (515) 232-2103
FAX: (515) 232-2825
Kevin Vinchattle, Executive Director

IOWA TURKEY FEDERATION
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Ames, IA 50010-0825
TEL: (515) 232-7493
FAX: (515) 232-2825
Gretta Irwin, Executive Director

KANSAS POULTRY ASSOCIATION & KANSAS TURKEY FEDERATION
Kansas State University
Department of Animal Science
130 Call Hall
Manhattan, KS 66506
TEL: (913) 532-1201
FAX: (913) 532-5681
John Miller, President
sveyer@oz.oznet.ksu.edu

KENTUCKY POULTRY FEDERATION/EGG COUNCIL
P.O. Box 21829
Lexington, KY 40522-1829
TEL: (606) 266-8375
FAX: (606) 266-8375
Carole Knobbett, Executive Director

KENTUCKY POULTRY IMPROVEMENT ASSOCIATION
604 Garrigus Building
Lexington, KY 40546
TEL: (606) 257-7529
FAX: (606) 258-1027
Anthony Pescatore

RESOURCE INFORMATION

LOUISIANA POULTRY FEDERATION
241 Knapp Hall
Louisiana State University
Baton Rouge, LA 70803
TEL: (504) 388-8667
FAX: (504) 388-2478
Rosilyn Williams, Poultry Specialist
rwilliams@agctr.lsu.edu

MAINE POULTRY FEDERATION
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Augusta, ME 04330-0228
TEL: (207) 622-4443
FAX: (207) 623-3748
William Bell, Executive Director
newengag@mint.net

MARYLAND EGG COUNCIL, INC.
3109 Animal Science Center
University of Maryland
College Park, MD 20742
TEL: (301) 405-5775
FAX: (301) 314-9557
Dr. John Doerr, Chairman

MASSACHUSETTS POULTRY ASSOCIATION
22 Kimball Place
Fitchburg, MA 01420
TEL: (508) 345-4103
FAX: (508) 345-7187
Richard Francis, Director of Operations

MIDWEST POULTRY FEDERATION & MINNESOTA TURKEY GROWERS ASSN.
2380 Wycliff Street
St Paul MN 55114
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FAX: (612) 646-4554
Jodi Day, Executive Director
mnturkey@aol.com

MIDWEST UNITED EGG PRODUCERS
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124 North Second Street
Eldridge, IA 52748
TEL: (319) 285-9100
FAX: (319) 285-9109
Gerald Weber, President

MISSISSIPPI POULTRY ASSOCIATION, INC.
P.O. Box 13309
Jackson, MS 39236-3309
TEL: (601) 355-0248
FAX: (601) 353-3840
Mike McAlpin, President

MISSOURI POULTRY FEDERATION
225 East Capital
Jefferson City, MO 65101
TEL: (573) 761-5610
FAX: (573) 761-5619
JoAnn Manhart, Executive Director

NATIONAL BROILER COUNCIL
The Madison Building, Suite 615
1155 15th Street, N.W.
Washington, DC 20005-2706
TEL: (202) 296-2622
FAX: (202) 293-4005

NATIONAL GOOSE COUNCIL, INC.
7 Oak Street West, P.O. Box 267
Sisseton, SD 57262-0267
TEL: (605) 698-7651
Marlin Schiltz, President

NATIONAL INDEPENDENT POULTRY & FOOD DISTRIBUTORS ASSN.
958 McEver Rd., Ext. B5
Gainesville, GA 30554
TEL: (770) 535-9901
FAX: (770) 535-7385
Kristin McWhorter Braun, Executive Director

NATIONAL TURKEY FEDERATION
1225 New York Avenue NW, Suite 400
Washington, DC 20005
TEL: (202) 898-0100
FAX: (202) 898-0203
Stuart L. Proctor, President

NEBRASKA POULTRY IMPROVEMENT ASSOCIATION
A 103 Animal Sciences
University of Nebraska
P.O. Box 830908
Lincoln, NE 68583-0908
TEL: (402) 472-2051
FAX: (402) 472-6362
Susan S. Joy, General Manager

NEW HAMPSHIRE POULTRY GROWERS ASSOCIATION
20 Goodhue Road
Boscawen, NH 03303
TEL: (603) 796-2890

NEW YORK STATE POULTRY COODNINATED EFFORT, INC.
5411 Davison Road
Clerance, NY 14031
TEL: (716) 759-6802
Kurt Kreher, President

NORTH CAROLINA EGG ASSOCIATION
1150 SE Maynard Rd., Suite 130
Cary, NC 27511
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Ed Woodhouse, Executive Director

RESOURCE INFORMATION

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Helen Tomicic, Regional Manager

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Jack Heavenridge, Executive Vice President

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Randy Wyatt, Contact

OREGON BROILER GROWERS ASSOCIATION
Shady Oak Farm
84380-N Cloverdale Road
Creswell, OR 97426-9431
TEL: (503) 746-2074
Shirley McGuire, Secretary
David Johnson, President

OREGON POULTRY INDUSTRIES COUNCIL
P.O. Box 3003
Portland, OR 97208-3003
TEL: (503) 777-1320
FAX: (503) 777-2373
Steven Wagner, President

PENNSYLVANIA POULTRY FEDERATION
500 North Progress Avenue
Harrisburg, PA 17109
TEL: (717) 652-7530
FAX: (717) 652-0230
John D. Hoffman, Executive Director

SOUTH CAROLINA POULTRY FEDERATION
1201 Main Street, Suite 1220
AT&T Building
Columbus, SC 29201
TEL: (803) 748-1283
FAX: (803) 748-1294
Connie P. Smith, Executive Director

SOUTH DAKOTA POULTRY INDUSTRY
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Brookings, SD 57007
TEL: (605) 688-5165
FAX: (605) 688-6170
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1530 Cooledge Road
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TEL: (770) 493-9401
FAX: (770) 493-9257
Don Dalton, President
Internet: http://www.poultryegg.org

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P.O. Box 556
Tucker, GA 30085
TEL: (770) 491-1120
FAX: (770) 491-1145
David Reesman, President

TENNESSEE EGG & POULTRY ASSOCIATION
P.O. Box 11082
Knoxville, TN 37939-1082
TEL: (423) 974-7351
FAX: (423) 974-9043
Dr. Carolyn Miller, President

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P.O. Box 40627, Melrose Station
Nashville, TN 37204
TEL: (615) 837-5120
FAX: (615) 837-5335
Mark Farrar, Administrator

TEXAS POULTRY FEDERATION
8140 Burnet Road
P.O. Box 9589
Austin, TX 78766-9589
TEL: (512) 451-6816
FAX: (512) 451-5142
James Grimm, Executive Director

UNITED EGG ASSOCIATION
One Massachusetts Avenue, NW, Suite 800
Washington, DC 20001
TEL: (202) 842-2345
FAX: (202) 682-0775
Christine Nelson, Legislative Director

UNITED EGG PRODUCERS
1303 Hightower Trail, Suite 200
Atlanta, GA 30350
TEL: (770) 587-8571
FAX: (770) 587-0041
Al Pope, President

USA POULTRY & EGG EXPORT COUNCIL
2300 West Park Place Boulevard, Suite 100
Stone Mountain, GA 30087
TEL: (770) 413-0006
FAX: (770) 413-0007
James Sumner, President

UTAH TURKEY MARKETING BOARD
P.O. Box 368
Moroni, UT 84646
TEL: (801) 436-8221
FAX: (801) 436-8101
Dave Bailey, President

RESOURCE INFORMATION

VERMONT POULTRY IMPROVEMENT BOARD
116 State Street
Drawer 20
Montpelier, VT 05620-2901
TEL: (802) 828-2500
FAX: (802) 828-2361
Russell Lassocky, Director

VIRGINIA EGG COUNCIL, INC.
911 Saddleback Court
McLean, VA 22102
TEL: (703)790-1984
FAX: (703) 821-6748
Cecilia Glembock, Executive Director

VIRGINIA POULTRY FEDERATION
P.O. Box 552
Harrisonburg, VA 22801
TEL: (540) 433-2451
FAX: (540) 433-3256
John Johnson, President

WASHINGTON POULTRY INDUSTRY ASSOCIATION
P.O. Box 370
Rochester, WA 98579
TEL: (360) 273-5984
FAX: (360) 273-6901
Rod Smart, President

WASHINGTON POULTRY IMPROVEMENT ASSOCIATION
3825 154 Avenue, NE
Redmond, WA 98052
TEL: (206) 885-1414
FAX: (206) 885-3305
Tony Blanch, Secretary/Treasurer

WEST VIRGINIA POULTRY ASSOCIATION
P.O. 612
Moorefield, WV 26836-0612
TEL: (304) 538 2725
Grover See, Executive Secretary

WILKES AREA POULTRY ASSOCIATION
541 Gaither Road
Statesville, NC 28625
TEL: (704) 872-6227
FAX: (704)872-1452
Jim Sutton, Chairman

WISCONSIN POULTRY IMPROVEMENT ASSOCIATION
260 Animal Science Building
1675 Observatory Drive
Madison, WI 53706-1248
TEL: (608) 262-9764
FAX: (608) 262-5157
Louis C. Arrington, Professor

Other Supporting USDA Agencies

Farm Service Agency

The USDA's Farm Service Agency supports the U.S. agricultural community through commodity programs, farmer operating and emergency loans, conservation, domestic and overseas food assistance and disaster programs that improve the economic stability of agriculture and the environment. These programs help farmers produce an adequate food supply, compete for export sales, and keep consumer prices reasonable while caring for the environment and natural resources.

The Farm Service Agency's mandate is to assure a continuous supply of food and fiber for all Americans, and to promote sound resource management systems. As part of this mandate, it works with poultry producers to share the costs of solving erosion and water quality problems that result from nonpoint source pollution.

Services Available to Growers

The Farm Service Agency administers low-cost loans and cost-share programs. Under the latter, it is authorized to share with producers up to 60 percent of the cost of some conservation practices, including the building waste storage facilities such as lagoons, dry-stacks, and composting units.

Contact

For more information about cost-share programs, call or visit the FSA office listed in your telephone directory.

Cooperative State Research, Education, and Extension Service

The Cooperative State Research, Education and Extension Service (CSREES) links the research and education programs of the USDA and works with land-grant institutions to advance a global system of research, extension, and higher education in the food and agricultural sciences. Its overall mission emphasizes partnerships with the public and private sectors to maximize effectiveness and to improve economic, environmental, and social conditions in the United States.

Services Available to Growers

Educational programs to protect natural resources and the environment, to manage waste efficiently, and to deal with water quality are included in the national priority initiatives of the State Cooperative Research, Education, and Extension System. The Service (which is probably better known simply as Cooperative Extension) is internationally known as a leader in providing community access to research and education. Its publications are widely available and many of them are on the Internet.

Contact

For more information about the Cooperative State Research, Education, and Extension Service, call or visit the CSREES office listed in your telephone directory under local government.

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